

AN EXAMINATION OF COLLEGE OF AGRICULTURE AND LIFE SCIENCES
FACULTY PERCEPTIONS REGARDING HIGHER ORDER THINKING
OPPORTUNITIES AND HIGH IMPACT LEARNING EXPERIENCES FOR
STUDENTS

A Thesis

by

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ABSTRACT

Higher order thinking is a cognitive process that occurs at higher-levels of thinking. Institutions of higher education desire to graduate persons with the ability to think critically and to be able to contribute effectively in the work force. Higher order thinking opportunities are a critical part of this process. The purpose of this study was to assess higher order thinking opportunities for students from the perspective of faculty members in a college of agriculture at a land grant institution and to gain an understanding of these same faculties' thoughts towards high impact learning opportunities.

The two-part study examined higher order thinking opportunities and high impact learning awareness. Guiding questions for the study included: What level(s) of cognitive engagement and experiences do teaching faculty in a College of Agriculture and Life Sciences provide for students? And, how familiar are faculties with high impact learning teaching strategies?

An online questionnaire was created based on the work of Whittington that sought to describe attitude towards providing higher order thinking opportunities with additional questions to describe the awareness of high impact learning strategies. The questionnaire was constructed through the use of Qualtrics™, the university's survey software, and distributed to faculty through university email. Data collected was analyzed using SPSS™, a statistical analysis program.

Analysis of data revealed that faculties in the college of agriculture contain a positive attitude toward instructing at higher levels of thinking with a mean of 226 on a scale ranging from 50 to 300, and provide their students with a wide range of learning activities. Gender, tenure, or receiving of a teaching award was not found to be a statistically significant predictor of attitude toward instructing at higher levels of thinking. Findings revealed assessment development as one area of need and also an inconsistent awareness of Bloom's Taxonomy. Respondents were predominately positive toward the implementation of high impact learning experiences but indicated the need for additional support from administration related to the implementation of high impact learning strategies.

DEDICATION

This document is dedicated to several former teachers who taught me to love learning. First and foremost to my chemistry teacher, Mrs. Fran Prukop who through her love of teaching chemistry, touched the lives of so many at Sharyland High School as she was one teacher who's classroom was so warm and inviting no matter the frustrations we brought into her class. During the construction of this thesis, Mrs. Prukop was diagnosed with many life threatening sicknesses. It was her former students' turn to show her the love and support she needed to beat the many odds against her. There are no words that can be expressed to say how much you have touched our lives. Thank you, Mrs. Prukop you are what a teacher should be.

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INTRODUCTION

Critical thinking, or problem solving, is a skill that all students benefit from as it increases productivity in the workplace and preparedness for life beyond formal education. Opportunities to develop these skills are essential. There is a need for teaching faculty to present opportunities that allow for skill development in critical thinking. Ulmer and Torres (2007) found that higher order thinking opportunities are rare in science and agriculture courses at the secondary level; science faculty taught 16.62% of the time and agriculture education faculty taught 18.59% of the time at higher levels of thinking. Thus, one can conclude that many students who enter institutions of higher education may not be immediately ready for learning at higher levels of thinking.

High Impact Learning (HIL) is one strategy that can be utilized to increase critical thinking and higher order thinking skills and abilities. HIL was coined by George Kuh in an effort to increase high quality engagement among teaching faculty and students (Kuh, 2008). High Impact Learning is one instructional and learning method that builds relationships among students and faculty through interactions of common learning and development experiences. These experiences include activities such as: intensive writings, researching side by side, application of leadership tools learned in class through community service opportunities, and formation of learning communities.

The overarching goal of this study was to articulate faculties' attitude and aspired level of teaching at higher levels of thinking and awareness of and willingness to deliver high impact learning experiences.

Overview of Literature and Theoretical Framework

Institutions of higher education, public or private, strive to develop critical thinking skills and abilities in their learners through learning and teaching strategies. Many teaching faculty have a general idea of what critical thinking skills entail. Arons (1985) stated there are two qualities of knowledge (i.e., declarative and operative) that a learner must have to be a successful critical thinker. Declarative knowledge refers to factual knowledge and operative knowledge refers to the ability to comprehend and use the declarative. According to Whittington (1995), there are eight actions a learner should be able to do successfully to be a critical thinker: (a) possess logical reasoning abilities, (b) possess and use reflective judgment, (c) create and understand assumptions, (d) test meaning, (e) possess analytical and argumentative capacities, (f) reflect a variety of attitudes of thought, (g) distinguish bias from reason and (h) implement thought into work towards a goal (Whittington, 1995).

A learner's level of ability in thinking and learning can be classified using a taxonomy created by Benjamin Bloom (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). According to Bloom, there are six levels of learning: (a) knowledge, (b) comprehension, (c) application, (d) analysis, (e) synthesis, and (f) evaluation (Bloom et al., 1956). Figure 1 displays Bloom's Taxonomy of Educational Objectives with a short descriptive definition for each level.

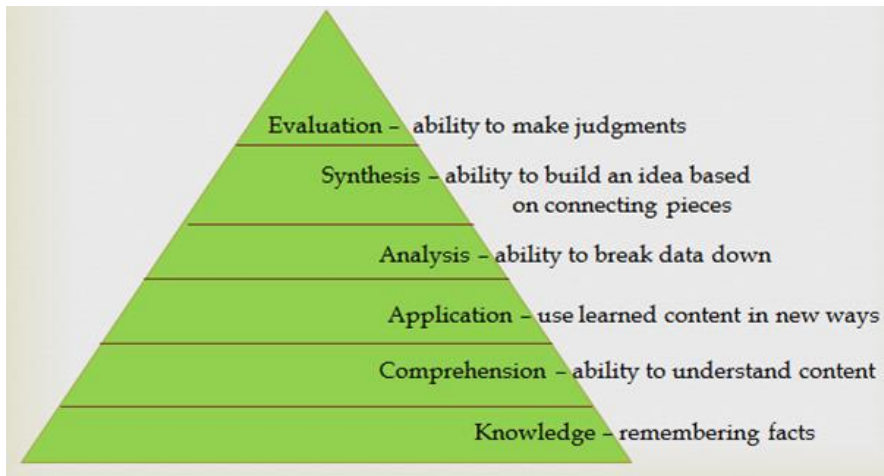


Figure 1. Bloom's Taxonomy of Educational Objectives
(Blooms et al., 1956)

A fundamental physiologist, Jean Piaget, laid the ground work for future learning models to be developed. It was through his study of cognitive development of children that lead to publications of the developmental stages of learners (Huitt & Hummel, 2003) and has provided teaching faculty with an abundance of learning models to use in their instruction such as: (a) Lewinian Experiential Model based on observations and reflections (Kolb, 1984); (b) Dewey's experiential learning that brings in feedback to generate feelings (Kolb, 1984); and (c) David Kolb's Learning Cycle which brings the entire learner into the learning cycle through emotions, viewing, processing and undertaking (Stokes-Eley, 2007). George Kuh, has expanded upon the successful learning strategy of experiential learning with the articulation of the concept of "high impact learning" (Kuh, 2008). High impact learning differs from other teaching strategies in that the teaching faculties are directly involved in learning alongside the

learner. This formal collaboration builds a relationship that fosters an environment to support the learner into a lifelong learner (Kuh, 1995).

Research has revealed that many teaching faculty are not taking advantage of the strategies related to high impact learning and are choosing to instruct at lower levels of thinking (Edwards & Briers, 2000; Ewing & Whittington, 2009; Torres & Cano, 1995; Whittington, 1995). Barak and Shakhman (2008) conducted a study to determine what caused teaching faculty to instruct at lower levels of thinking by assessing if teaching faculty knew how to effectively instruct science content that would naturally lead to higher order thinking. Teaching faculty reported they were unsure of their own abilities based on the lack of knowledge and how to foster an environment that was beyond lower order thinking while they were uncertain of their students' true abilities. In an additional study by Swart, it was found that the dominate level of writing that occurred in an engineering course was at the application level (2010).

Given the fact that faculty have been documented as instructing at lower leveling of thinking, there is need to document teaching faculty's teaching abilities related to higher levels of thinking and identify areas that would benefit from professional development and support.

Conceptual Framework

The conceptual framework for the manuscript, *An Examination of College of Agriculture and Life Sciences Faculty Perspectives Regarding Higher Order Thinking Opportunities for Students*, was based upon the concept of critical thinking and the utilization of the six postulates contained in Bloom's Taxonomy of Educational

Objectives for the cognitive domain of learning: (a) knowledge, (b) comprehension, (c) application, (d) analysis, (e) synthesis, and (f) evaluation. Bloom's Taxonomy was designed to gradually have an increase in the level of rigor in learning (Clark, 1999). The levels of knowledge and comprehension, known as Lower Order Thinking, provide a foundation for cognitive learning and ability that allow for gradual mastery of Higher Order Thinking: (a) application, (b) analysis, (c) synthesis, and (d) evaluation. Teaching faculty often find instruction to occur at the knowledge and comprehension levels to be easier to deliver while some faculties struggle to provide learners with activities that require higher levels of thinking and processing to engage learners (Zohar & Dori, 2003).

With concern to the second manuscript, *An Examination of College of Agriculture and Life Sciences Faculty's Awareness of High Impact Learning Strategies and Implementation*, the theoretical framework was built upon motivation for active engagement as described through the expectancy theory (Guth & MacMillan, 1986). The framework for this study centered on faculty perceptions and willingness to engage in high impact learning experiences for students in order to facilitate the preparation of students with needed qualities. Colleges and universities have continued to strive to engage and stimulate learners in critical thinking.

Statement of the Problem

Institutions of higher education desire to graduate persons with the ability to think critically and be able to contribute effectively in the work force. Higher order thinking opportunities are a critical part of the process of developing quality learning

experiences in the classroom. Are learners being encouraged to think critically? Are teaching faculty aware of the differences between lower level and higher level thinking opportunities? Are teaching faculty providing opportunities to provoke higher order thinking skills and abilities in their learners?

Purpose and Objectives

The purpose of the study was to determine the faculty's desire to instruct at higher levels of cognition as determined by their attitude associated with teaching at higher levels of thought processing and to define awareness and personal thoughts toward high impact learning in relation to implementation.

The objectives of the study were to determine current cognition levels being implemented in courses, aspired levels of instruction, and attitude toward teaching at higher levels. The second objective was to provide insight regarding the implementation of high impact learning experiences and to determine needs of faculty to expand the implantation of high impact learning.

Methodology

Survey methodology was utilized to collect data from teaching faculty across a college of agriculture. The study was an amended reproduction of Whittington's 1995 research project titled *Higher Order Thinking Opportunities Provided by Professors in College of Agriculture Classrooms* (Whittington, 1995). The survey implemented contained 96 questions: (a) 23 demographic items concerning learners and teaching faculty, (b) 12 Bloom's Taxonomy statements for identification, (c) Whittington's original 50 questions and three additional Likert scale items (1995) and (d) eight high

impact learning awareness and interest questions. All participants provided consent for participation as per Institutional Review Board (IRB) approval documentation. The modified survey was created using Qualtrics™ (2009) and distributed via campus email.

Readily available information regarding faculty posted on university sponsored websites was collected regarding teaching faculty in order to shorten the length of the survey through the removal of demographic questions that could be answered with this information. This information was validated by a representative from each department either by phone, email or in-person in preparing the final list of teaching faculty who instructed at the main campus during the 2013 spring semester.

The study population was the entire teaching faculty in a College of Agriculture and Life Science. The college is at a land grant institution that consisted of 14 departments: (a) Animal Science, (b) Biochemistry and Biophysics, (c) Economics, (d) Agricultural Leadership, Education and Communications, (e) Biological and Agricultural Engineering, (f) Ecosystem Science and Management, (g) Entomology, (h) Horticultural Sciences, (i) Nutrition and Food Science, (j) Plant Pathology and Microbiology, (k) Poultry Science, (l) Recreation, Park and Tourism Sciences, (m) Soil and Crop Sciences and (n) Wildlife and Fisheries Sciences. The possible respondent population was 328 teaching faculty who had instructed a course, undergraduate or graduate, in any one of the 14 departments in the spring 2013 semester.

The researcher contacted teaching faculty through their university sponsored emails that utilized the university sponsored survey software for data collection, Qualtrics™ (2009). An initial informational notification came from administrative

personnel, to encourage participation and exhibit support of the study. One week later a notification was sent to inform the population of the activated link to complete the study. After four weeks, a reminder was sent to only those teaching faculty who had yet to complete the survey or be removed from the study. The final reminder was sent out an additional four weeks later to the teaching faculty who had not completed the survey. Delivery of the survey, four weeks between contact for completion of survey, was based on the recommendations of Dillman (2009). Once data collection was completed the data was organized into the IBM SPSS software to analyze data.

Limitations

Given that 54% of the respondents reported having received a teaching award, a limitation exists that those who completed the survey held the greatest interest in teaching. It is also recognized that the quantity of questions in the survey (96 items) could have been a deterrent to survey completion.

AN EXAMINATION OF COLLEGE OF AGRICULTURE AND LIFE SCIENCE FACULTY PERSPECTIVES REGARDING HIGHER ORDER THINKING OPPORTUNITIES FOR STUDENTS

Introduction

Encouraging and developing skills and abilities in students to think critically while solving problems and working cooperatively is essential for success in life. Teaching methods that encourage higher order thinking have been studied in various settings across the United States. Specifically, studies have been conducted that focus on encouraging higher order thinking in animal science courses (Edwards & Briers, 2000), written compositions from engineering students (Swart, 2010) and general science courses (Barak & Shakhman, 2008). Additional studies have focused on modeling higher order thinking (Ball & Garton, 2005) and encouraging higher level thought processes (Jones, 1992).

Previous studies have described the courses that provoke higher order thinking, however, there are many other aspects that can impact higher order thinking which include the course content, the instructional methods, personal opinion or desire, and knowledge and ability of the teaching faculty of each course (Ball & Garton, 2005; Barak & Shakhman, 2008; Torres & Cano, 1995; Whittington, 1995). One important factor that impacts the development of courses is the learner and his/her role in the learning process because what they bring to the course (Barak & Shakhman, 2008; Zohar & Dori, 2003) is driven by prior knowledge, experiences or lack thereof and personal effort put forward within the course. Studies have focused on faculty's desired

level of instruction and revealed that the desired level of teaching often does not match that of the actual level of instruction (Ulmer & Torres, 2007). The importance of encouraging “higher level thinking” has been documented in the literature (Brookfield, 1987); however, the literature fails to state the overall educator’s instructional knowledge of how to teach or the art of teaching. If teaching faculty do not have the necessary tools to engage beyond lower order thinking opportunities (i.e., knowledge and comprehension), then learners will lack the ability to successfully operate in situations that require higher order thinking skills for solving problems. Barak and Shakhman (2008) sought to describe the abilities of science teaching faculty to implement higher ordering thinking in their classrooms and their personal perception and ability. The researchers found that teaching faculty expressed three distinct elements that prevented higher order thinking instruction to occur: (a) lack of confidence, to instruct and implement science content; (b) lack of ability to verbally deliver science content; and (c) lack of belief in students’ ability to be successful at higher levels of thinking. Results revealed that only a slight majority (55%) of teaching faculty reported confidence in encouraging higher order thinking, while slightly under the majority (45%) of students reported confidence in higher order thinking. However, a high confidence level was not held by educators for their learners’ ability to successfully function with coursework that required higher order thinking skills (Barak & Shakhman, 2008). It was noted by Whittington (1995), educators who engaged in acquiring skills to encourage higher ordering learning opportunities were more apt to instruct their courses at such levels.

Tools are available to help instructors increase the amount of critical thinking required in courses. One teaching strategy, scaffolding, when applied to instruction creates a gradual increase in level of questioning (Zohar & Dori, 2003). This well-known tool allows all learners to have confidence because they are beginning at the knowledge level, (i.e. fact recall), to develop the student's skills and ability and progressing to the evaluation of thought and creation of new information or ideas. As teaching faculty guide their students through the process, teaching faculty may need to stay at certain levels for varying periods of time in order to allow for mastery. This format of scaffolding was how the Texas Essential Knowledge of Skills was developed (Texas Education Agency, 2010, 2010-2011). Similarly, the skill of critical thinking can be developed through the use of instructional tools and gradual increase in level of questions (Zohar & Dori, 2003).

Critical thinking is an important part of higher order thinking, directly linked to higher order learning. It has been found that many individuals hold a misunderstanding of what critical thinking is and how it appears in a classroom. For this study, critical thinking was defined as one's ability to solve problems that exist in the world around oneself (Brookfield, 1987; Mish, 2003). Although many hope that critical thinkers will be able to solve real-world problems, critical thinking that occurs in classrooms may not be transferable to settings outside the classroom (Brookfield, 1987). To further expand upon the definition of critical thinking, Brookfield shared nine themes to indicate the occurrence of critical thinking: (a) engage in a positive and productive activity; (b) students experience a continual process, not a result; (c) expression differs in relation to

the context; (d) triggers positive and negative events; (e) activities are emotional and rational; (f) identifies and tests assumptions; (g) considered central aspect; (h) challenges significance of context; and (i) explores and visualizes alternatives to solving problems and thus leading to reflective skepticism. It should be noted that critical thinking skills develop over time and more readily occur in adults versus young children (Brookfield, 1987).

Novak (2002) pointed out that not all learners have an internal structure of well-organized conceptual frameworks for learning because concepts are not always interrelated to one another when learning experiences are first presented in rote memorization. This is important to note because faculty need to be aware that their courses are composed of a variety of learners along with individual needs and styles of learning. This concept separates critical thinkers from non-critical thinkers. In this way, a faculty provides a structure for all learners by focusing on the cognitive domain.

The cognitive domain of learning is guided by instructional statements of objectives which contain a verb and a noun. The verb generates a level of cognitive engagement, or rigor, along with a noun, indicating the content being taught (Anderson et al., 2001). Ralph Tyler, as noted by Anderson et al., uses a similar format to construct instructional statements of objectives, where a behavior replaced the verb and knowledge is developed by the learner through specific content, instead of a specific noun. Educational objectives are achieved over a duration of time (i.e. weeks or months), during the delivery of the units of instruction. Instructional objectives are narrower in scope and usually require hours or days to complete (Anderson et al., 2001).

A tool developed to assist educators to develop educational and instructional objectives was the Taxonomy Table (Anderson et al., 2001). The table contains rows horizontally that describe the levels of Bloom's Taxonomy of Educational Objectives of instruction that identify six distinct levels: (a) knowledge, (b) comprehension, (c) application, (d) analysis, (e) synthesis and (f) evaluation. The table contains vertical columns that describe the degree of knowledge wished to be conveyed: (a) factual, (b) conceptual, (d) procedural, and (e) metacognitive. The Taxonomy Table allows for faculty to create any objective based on the cross section of the two categories and assists educators in developing specific instructional objectives that ensure generated questions, course work material and assessments are aligned with the desired outcome (Anderson et al., 2001). Faculties' use of the Taxonomy Table allows learners to experience the desired level of thinking opportunities their educators intend for them.

Researchers have evaluated pre-service faculty's prior exposure to cognitive engagement and current faculty's assessment style. It was evident in Ball and Garton's (2005) study, pre-service educators were not exposed to written objectives, instruction, and assessments of equal cognitive engagement at one time. Faculties are responsible for more than simply teaching content. Each day of instruction requires a faculty to design an entire lesson, including choosing the most effective method(s) to reach the academic goal of achievement. Current assessments focus more on the inquiry process of science rather than rote memorization of materials to learn and fully understand science instruction thus requiring instructional style to change (Wang, Kao, & Lin, 2010).

Critical thinking and the usage of Bloom's Taxonomy has begun to receive national recognition. The National Education Goals Panel reported the need to use Bloom's Taxonomy of Educational Objectives for instructing at higher levels of thinking to develop critical thinking skills (National Education Goals Panel, 1991). Various universities have begun to implement their own strategies to encourage higher order thinking opportunities that focus on undergraduates and graduate students (Carey, 2012).

Conceptual Framework

The conceptual framework for this study was framed by the need for critical thinking and the role that Bloom's Taxonomy of Educational Objectives can play in encouraging learning. Encouraging students to think beyond the meanings of typed words is a fundamental step in the development of critical thinking skills (Swart, 2010). An instructional goal for instructors is to present the global context of instructional content that allows opportunities for students to apply and develop new connections to the original meaning. This ability allows for students to develop their problem solving skills while experiencing the results of their outcome (Whittington, 1995). Krathwohl, Bloom and Masia (1964) define a taxonomy as "...a set of classifications which are ordered and arranged on the basis of a single principle or on the basis of a consistent set of principles" (p. 11). Krathwohl et al. (1964) dissected Bloom's Taxonomy of Educational Objectives into three domains: (a) cognitive, (b) affective and (c) psychomotor. Faculty may affect all three domains during a course: (a) cognitive, affected during delivery of instruction as connected to content; (b) affective, affected

through verbal communication between instructor and learner(s); and (c) psychomotor, affected when the activity requires controlled body movements.

In addition to critical thinking, Bloom's Taxonomy and the Theory of Planned Behavior (Ajzen, 1991) frames the outcomes of the study. A behavior is the result of three beliefs: behavioral, normative and control. Each belief affects the resulting intention: (a) the behavioral belief affects resulting attitude of a person; (b) the normative belief is controlled by the subjective norm of the organization; and (c) the control belief is affected by the perceived behavioral control (Armitage & Conner, 2001). "In general, the more favourable the attitude towards the behaviour, the stronger should be the individual's intention to perform it" (Armitage & Conner, 2001, p. 474).

Purpose and Objectives

The purpose of this study was to describe the College of Agriculture and Life Sciences teaching faculty's aspired levels of teaching and attitudes towards teaching at higher levels of cognitive behavior. The objectives for this study included: (a) determine aspired levels of higher order thinking opportunities by faculty and (b) determine faculty awareness of Bloom's Taxonomy of Educational Objectives.

Methodology

The study utilized survey methodology to collect data. The instrument consisted of a 96-item survey that required approximately 30 – 35 minutes for completion. The survey included four sections: (a) demographics and class information, (b) level of awareness of Bloom's Taxonomy of Educational Objectives, (c) faculty's aspired levels

of instruction and attitude toward higher order thinking opportunities, and (d) awareness and perception of high impact learning.

Each of the sections of the survey had a specific purpose. The first section of the survey focused on the collection of demographics and information related to the courses taught by the respondent and allowed the researcher to articulate a description of the respondent's demographics and the respondent's experience in the classroom. The second section of the survey was designed to assess faculty member's awareness of the six levels of instruction. Bloom's Taxonomy of Educational Objectives was used as the guide to investigate teaching faculty's knowledge of categories of written objectives. Twelve lesson objectives were presented to the participants. Respondents were asked to classify each statement according to Bloom's Taxonomy with all six levels as an option for every statement: (a) knowledge, (b) comprehension, (c) application, (d) analysis, (e) synthesis and (f) evaluation. The third section of the survey focused on the determination of faculty's aspired levels of instruction and attitude towards higher order thinking opportunities and was based upon the works of Whittington (1995). The researcher utilized Whittington's (1995) 50-item Likert scale questions because it had been deemed reliable and valid with a Cronbach's Alpha reliability score of 0.854 of the study at hand. Respondents were asked to indicate their degree of agreement with each statement using a score of a one through six, a one indicating strongly disagree and a six indicating strongly agree. Thirty-three questions were written in this format while the remaining 17 questions were written in the reverse direction. The 17 reversed coded questions were re-coded in the opposite format to allow for comparison among all 50

statements. Ellner et al. (1983) noted that researchers should use already developed instruments to allow data collected in the different studies to be more valid and measurable for outcomes. The use of Whittington's questionnaire (1995) for completion of the study was directly aligned with this concept. The final section of the survey was focused on awareness and attitude toward high impact learning experiences. The data collected in this section was the focus of an additional manuscript, *An Examination of College of Agriculture and Life Sciences Faculty's Awareness of High Impact Learning Strategies and Implementation*.

The implementation of the survey followed the guidelines of Dillman (2009) and allowed four weeks between each contact with the population. A pre-notice was sent to the teaching faculty in the College of Agriculture and Life Sciences to inform those in the population regarding the purpose of survey and to inform them that the survey would be coming in the near future (see Appendix B). The adapted survey was distributed a week later via email (see Appendix C) with a direct link to the survey through the university software, Qualtrics™ (2009) (see Appendix A). A reminder was sent out four weeks later for those participants who had yet to complete the questionnaire (see Appendix D). A final reminder was then sent out four weeks later to the remaining teaching faculty who had yet to respond (see Appendix E).

The population selected was the entire teaching faculty from a College of Agriculture and Life Sciences that involved 328 teaching faculty during the 2013 spring semester. The respondents included teaching faculty who were employed in any of the following 14 departments within the College of Agriculture and Life Science: (a)

Agricultural Economics, (b) Agricultural Leadership, Education, and Communications, (c) Animal Science, (d) Biological and Agricultural Engineering, (e) Biochemistry and Biophysics, (f) Ecosystem Science and Management, (g) Entomology, (h) Horticultural Sciences, (i) Nutrition and Food Science, (j) Plant Pathology and Microbiology; (k) Poultry Science, (l) Recreation, Park and Tourism Sciences, (m) Soil and Crop Sciences, and (n) Wildlife and Fisheries Sciences. The exact list of faculty were compiled using data readily available to the general public on the departmental university sponsored websites and then confirmed by a spokesman, faculty or professional assistant, within each department. A document was created to describe each member in the population to lessen the number of questions to be answered by the respondents, such as department, faculty rank, education level and gender.

A total of 110 respondents completed the survey. However, 25 responses were removed due to lack of completion. The responding sample at hand was predominately teaching faculty who held a doctoral degree (57.9%) with the remaining respondents holding a master's degree (42.1%). Regarding specific faculty rank, 17.5% were assistant professors, 29.7% were associate professors, 22.4% were professors, and 16.6% were regents or executive professors. The number of responses per department ranged from a minimum of two to a maximum of 16 respondents per department with the exception of Poultry Science, which had no representation. Fifty-five was the mean age for teaching faculty. Respondents were predominately male (69%). The average number of years teaching experience was twenty years. Sixty-six respondents reported having received formal teaching training. Out of the 85 respondents, 72 respondents

indicated either having tenure or efforts to gain tenure. Data revealed that 54% of the teaching faculty had received some degree of recognition for their efforts in the classroom. Eighty-one percent of the respondents replied to have zero to five students with an individual education plan in their classroom.

The low response rate of 26% was addressed by grouping respondents as early and late responders. Comparison of Early to Late Respondents was recommended by Lindner, Murphy and Briers as a mechanism for addressing low response. Thus, early responders (58) and late responders (27) were compared. (Lindner, Murphy, & Briers, 2001). A chi-square test was used to analyze early and late responders based on their aspired level of instruction; the mean for early responders was 4.54 with a standard deviation of 0.394 and the mean for late responders was 4.49 with a standard deviation of 0.379. An independent sample test, Levene's Test for Equality of Variance revealed no significance between early and late respondents.

Limitations of the Study

Given that 46 of the 85 respondents reported having received a teaching award, it is recognized that it is possible that those individuals in the population most interested in teaching actually completed the survey. It is also recognized that the length of the survey (96 items) may have discouraged completion of the instrument.

Findings

This study specifically focused on teaching faculty's aspired levels of teaching and attitude toward teaching at higher levels. Completion of the survey required respondents to reflect on one course as they responded. Required and elective courses

were represented, 47 and 38 respectively. Two of the 85 courses described were honor level courses. Undergraduate and graduate courses were represented, 75 and 10 respectively. Of the 75 undergraduate courses described, three courses were sophomore level, 31 courses were junior level, and 73 courses were senior level. Respondents reported student's gender as equal and described their student populations as junior and senior level students. A range of student ethnicities were identified in the courses.

Objective I - Aspired Levels and Attitude Regarding Teaching with Higher Order Thinking Opportunities

The six-point scale used for the survey had a score of 50 as the lowest possible score and a score of 300 as the highest possible score. Attitude towards instruction at higher levels of cognition for respondents was found to have a mean of 226 (range 206 – 246). Thus, the mean of 226 revealed that respondents in the college of agriculture favored higher levels of cognition for their students. It was found that there were no significant relationships between a respondent's attitude score and their age, tenure or teaching awards received.

Respondents were asked to describe the level of cognition their students were engaged in during the course they choose to describe: (1) remembering refers to the knowledge level; (2) processing encompasses the comprehension, application and analysis levels; (3) creating relates the synthesis level; and (4) the evaluation level. Respondents could choose any of the four levels. Table 1 reveals the levels of cognition respondents reported as students are typically engaged with. Of the 85

responding faculties, 56 stated remembering, 70 stated processing, 49 stated creating and 57 stated evaluation. Twenty-eight respondents reported that they taught at all four levels and 17 faculties reported they only taught one of the four levels.

Table 1

Cognition Level of Engagement for Students as Perceived by Respondents in a Study to Determine Faculty Perspectives of Higher Order Thinking Opportunities for Students (N = 85)

Cognition Level	N	%
Remembering	56	65.9
Processing	70	82.4
Creating	49	57.6
Evaluating	57	67.1

Note. There were 28 respondents who selected all four categories while 17 faculties only selected one of the levels. Respondents could select more than one level.

Respondents reported various teaching methods implemented in their courses (Table 2). In fact, the statement related to using only one instructional method was indicated by over 21% as not being the way they taught. Respondents largely agreed that they utilize technology and student-to-student interaction opportunities in their classes.

Table 2

Respondents' Level of Agreement Related to Course Descriptors with Instructional Method, Use of Technology, and Student to Student Interaction Opportunities in a Study to Determine Faculty Perspectives of Higher Order Thinking Opportunities for Students (N = 85)

Statement	Strongly Disagree		Moderately Disagree		Slightly Disagree		Slightly Agree		Moderately Agree		Strongly Agree	
	N	%	N	%	N	%	N	%	N	%	N	%
Use of one instructional method per class	18	21.2	16	18.8	22	25.9	12	14.1	11	12.9	6	7.1
Technology as an instructional tool	2	2.4	3	3.5	3	3.5	16	18.8	27	31.8	34	40
Student-to-student interaction opportunities	2	2.4	3	3.5	5	5.9	16	18.8	21	24.7	38	44.7

Respondents reported three strategies to encourage cognitive thinking for learners: (a) connected to real world applications of ideas and events, (b) discussions as whole group to provoke thought, and (c) assignments that require students to use logical thought processes. Respondents provided additional elaboration to describe the specific activities implemented to support cognitive thinking for learners. These findings are displayed in Figure 2.

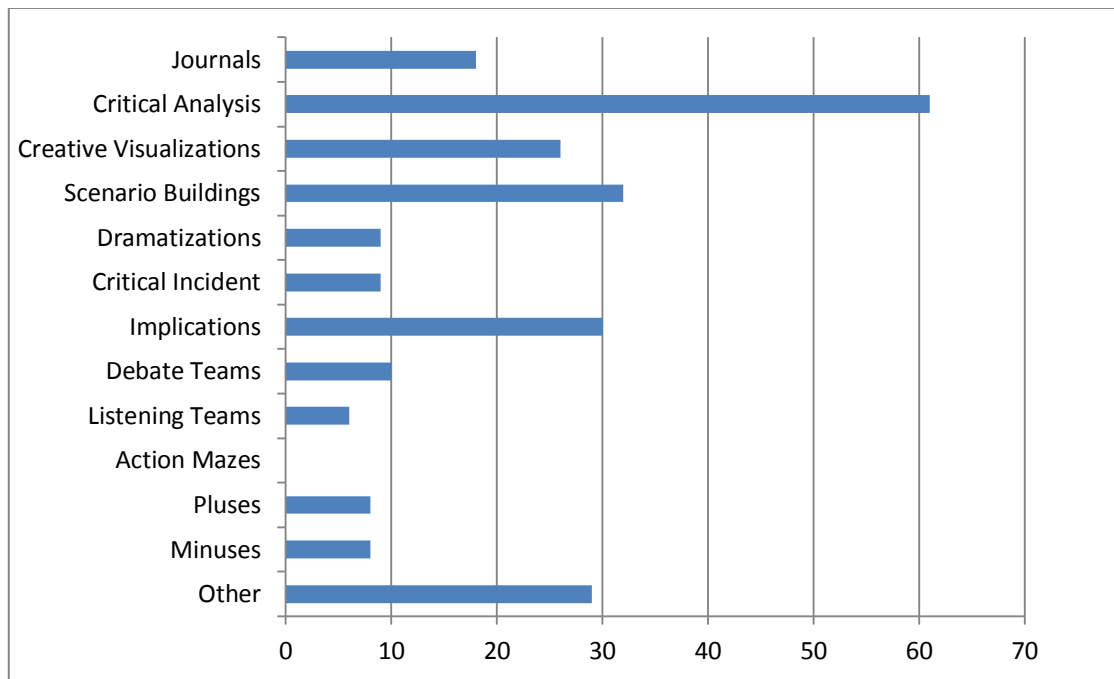


Figure 2. Teaching Strategies Reported by Respondents in a Study to Determine Faculty Perspectives of Higher Order Thinking Opportunities for Students. Faculty could choose more than one option.

Respondents had the opportunity to report teaching strategies through an open-ended question. Three basic activities that represented those responses included: (a) required students to experience all the levels of Bloom's Taxonomy; (b) laboratory research and projects related to the laboratory research; and (c) project-based learning through case studies and real life experiences as related to future careers. In addition to the activities in Figure 2, respondents identified strategies that support critical thinking development for students; these included: (a) feedback, from student to student, student to teacher and teacher to student, written or verbal; (b) problem solving through teamwork and application projects that provide opportunities for

students; and (c) discussions that provide students the clarity to understand how a topic was relevant to them.

In response to the open-ended question, “What type of assessment do you feel are most reflective of meaningful learning?” respondents reported the following as being used: (a) feedback faculty receive, (b) discussion, (c) rubrics, and (d) written papers. In response to the open-ended question, “What characteristics do you search for that informs you as an educator that meaningful learning has occurred in your students?” respondents indicated: (a) an increase in confidence with the use of soft and hard skills, (b) clarity of questions asked and answered and, (c) verbal and non-verbal indications of mastery through non-formal assessments. It was noted by several respondents that the development of assessments was an area that they needed to work on.

Objective II - Awareness of Bloom’s Taxonomy of Educational Objectives

Respondents were asked to identify 12 statements, two statements per level in terms of Bloom’s Taxonomy of Educational Objectives: (a) knowledge, (b) comprehension, (c) application, (d) analysis, (e) synthesis, and (f) evaluation. Two teaching faculty, a regents professor and a professor, did not complete this portion, thus there were 83 teaching faculty who responded. A statement was presented and respondents had the opportunity to choose any of the six levels (see Table 3). Each of the statements was reviewed and analyzed as an independent item.

Table 3

Correct and Incorrect Identification by Faculty of Statements Written at Each Level of Bloom's Taxonomy

Bloom's Taxonomy Statement		Correct		Incorrect	
		<i>n</i>	%	<i>N</i>	%
Knowledge	Q1	76	90.5	8	9.5
Knowledge	Q2	67	80.7	16	19.3
Comprehension	Q1	48	57.8	35	42.2
Comprehension	Q2	46	55.4	37	44.6
Application	Q1	61	72.6	23	27.4
Application	Q2	27	32.5	56	67.5
Analysis	Q1	20	23.8	64	76.2
Analysis	Q2	16	19.3	67	80.7
Synthesis	Q1	46	55.4	37	44.6
Synthesis	Q2	43	51.8	40	48.2
Evaluation	Q1	46	54.8	38	45.2
Evaluation	Q2	40	48.2	43	51.8

Note. Respondents could choose "Knowledge," "Comprehension," "Application," "Analysis," "Synthesis" or "Evaluation" for each of the statements. (N=84 for Knowledge Q1, Application Q1, Analysis Q1 and Evaluation Q1 statements) (N=83 for remainder of statements)

Conclusions

Objective I – Aspired Levels and Attitude Regarding Teaching with Higher Order Thinking Opportunities

Based on the finding that the mean score for attitude towards teaching at higher levels of thinking was 226, it was concluded that faculty possess a positive attitude towards higher order thinking. Given that there was not a significant relationship between attitude score and gender, tenure, or whether a respondent had won an award,

it was concluded that those characteristics do not predict attitude towards teaching. This finding was different than that of a previous study completed on the same topic in a different state (Whittington, 1995). Findings revealed that respondents use a range of activities to provide their students with higher order thinking opportunities within their courses and this could be related to the positive attitude of faculty. Given that only 28 respondents reported the use of all four cognitive levels, it was concluded that the majority (66%) of respondents do not use a variety of cognitive thinking during course instruction. Further, open-ended answers revealed that respondents see a need to develop and improve assessment skills.

Objective II – Awareness of Bloom’s Taxonomy of Educational Objectives

Findings revealed that respondents were able to identify written objective at the knowledge level very well while statements at the application and analysis levels were identified correct less frequently. It was concluded that faculty are not necessarily formally trained for classroom instruction; thus, faculty may not have had previous exposure to Bloom’s Taxonomy and the verbs that determine each level.

Implications

The positive attitude towards higher order thinking exhibited by respondents indicates the development of critical thinking in students in the College of Agriculture and Life Sciences. However, respondents revealed that the lack of skills in assessment abilities with a less than desirable level of awareness of Bloom’s Taxonomy could indicate engagement at higher levels of thinking may not be occurring universally across college courses. Assumptions can be made that once assessment skills are

sharpened and awareness of Bloom's Taxonomy are increased, the attitude regarding higher order thinking and student productivity related to critical thinking could increase.

Recommendations for Practice

It is recommended that professional development opportunities be provided focused on understanding how to better develop assessments. Learning to develop and implement quality assessments could improve student learning and critical thinking skills. Opportunities for teaching faculty to become more aware of Bloom's Taxonomy would also benefit faculty. Teaching faculty should be provided with opportunities for collaboration focused on instruction that could increase rigor and performance across courses.

Recommendations for Research

Further research is recommended in regard to the evaluation of the understanding and use of Bloom's taxonomy by faculty as a method of increasing critical thinking in the classroom. Professional development opportunities could improve this understanding and this should be documented. Additional research is also recommended in regard to documenting best practices for encouraging critical thinking through the interviewing of master teachers across the college.

AN EXAMINATION OF A COLLEGE OF AGRICULTURE AND LIFE SCIENCES FACULTY AWARENESS OF HIGH IMPACT LEARNING STRATEGIES AND IMPLEMENTATION

Introduction

The ability to think critically is recognized as an important individual attribute; however, it has been noted by Edward B Rust, Jr, State Farm Insurance CEO, that graduates are entering the workforce with less than adequate skills to successfully master an exam that utilizes critical thinking (Association of American Colleges and Universities & National Leadership Council, 2007). It has been found that many faculty actually fail to teach at high levels of critical thinking, thus limiting the opportunity for students to sharpen their critical thinking abilities (Burbach, Matkin, Quinn, & Searle, 2012; Whittington, 1995). In fact, a study by the University of Florida's faculty in the College of Agricultural and Life Sciences reported that their ability to develop critical thinking ability and skills in their students was a weakness. This has been emphasized as an area of need for faculty in regard to knowledge and skills (Harder, Roberts, Stedum, Thoron, & Myers, 2009).

Phan (2010) described critical thinkers to be shaped from two factors, self-regulation used during the learning process and previous strategies implemented. Students who are considered self-regulators set obtainable personal goals that are task-related, maintain motivation and retain personal responsibility for learning. Self-regulated learners have the ability to use and manipulate their cognitive and

metacognitive knowledge and strategies to meet personal expectations. Learners are essentially responsible for their own learning (Phan, 2010) within the university environment.

The college experience is ultimately aimed at preparing graduates for activities beyond college including professional careers, civic engagement and personal life. In today's world the number of typical college students, those who only attend class without additional factors that directly affect college courses, has decline greatly (Kuh, 1995). Students are attending multiple colleges, working, and raising families. The student population derives from a more diverse population and from varying levels of income. These students require instructional methods that are relevant to skills that solve real-life situations (Association of American Colleges and Universities & National Leadership Council, 2007).

Educational practices, especially in agriculture, have been highly guided and based upon experiential learning theories and practices. Georgiou (2008) reported that experiential learning was an instructional method that involved students being active learners that encouraged students to produce a culminating project at the end of the experience. Additionally, experiential learning requires reflection based on tangible experiences among participants that can develop a lasting memory and experience (Heriot, Cook, Matthews, & Simpson, 2007) requiring students to think abstractly. Experiential learning incorporates inductive and deductive learning in unison while teaching a concept (Georgiou et al., 2008). Experiential learning has the potential to meet the needs of more students because they are taught from all four modes of learning

(Stokes-Eley, 2007): (a) connection of emotions, (b) observing, (c) abstract thought and (d) active participation rather than a simply lecture structure.

However, Kirschner, Sweller, and Clark (2006) reported that experiential learning was not a teaching strategy that should be implemented. These researchers instead support strategies that cause students to pull from their long-term memory to solve problems to act within seconds to make the best decision. Student learning according to Ulrich, Jick and Glinow (1993) suggest the use of three guiding principles: (a) generate a large quantity of learning opportunities, (b) learning experience should be comprised of subsets that are connected to the whole and (c) gradually build up to the climax of their experience. This process of instruction is aligned with Kirschner, Sweller and Clark.

George Kuh utilized the prior learning theories and teaching methods to develop a strategy that is aimed to mold learners to be lifelong learners. George Kuh developed a learning and teaching method that has shown to be sweeping the nation's institutions of higher education, High Impact Learning Practices, HIL, (Kuh, 2008) to produce better quality college graduates. The term High Impact Learning (HIL) was developed based upon qualitative inquiry involving students and influential faculty and staff that affects the college experience as a whole. Kuh focused on the following aspects: (a) peer interaction, (b) specific leadership roles, (c) academic activities, (d) formally paid for duties completed, (e) faculty contact, (f) differences of inquiry based on gender, (g) travel ability, (h) limitations, based on type of college attended and institutional ethos and (i) college atmosphere and devotedness (Kuh, 1995). Based on findings, Kuh and

his researchers concluded that students need more meaningful ways to ensure their growth and personal development.

Kuh developed two leading research questions that focused on how students devote their time while attending college: (a) “How frequently and with what results, do students engage in educational practices-curricular, co-curricular and pedagogical-that provide them with realistic opportunities to actually develop the kinds of learning they need?” and (b) “How does such participation relate to expected learning outcomes?” (Kuh, 2008, p. 2). HIL was defined as an active, time-intensive, high level of engagement that builds bridges from learned experiences that are meaningful to learners (Kuh, 1995, 2008).

Kuh revealed four core elements that need further development in undergraduate students: (a) personal growth, (b) self-direction; (c) capacities and intellectual and (d) civic and ethical preparation. In addition to the four core elements, a need for a strong focus on intercultural and global learning was emphasized. The selected activities should have an aspect that has a direct connection to real world applications in both their civic duty and career path for the learner (2008). In order for the experience to be true and meaningful, a learner’s conversation and reflection would need to provoke critical thinking and inquiry. The text *The Essential Learning Outcomes* described four reasons that support experiential activities, (a) “knowledge of human cultures and the physical and natural world”, (b) “intellectual and practical skills”, (c) “personal and social responsibilities” and (d) “integrative and applied learning” (Kuh, 2008, p. 4). Each of these elements fosters an environment for High Impact Learning experience to reach

desired outcomes. Kuh shared ten educational practices that foster a HIL environment:

(a) first-year seminars and experiences, (b) learning communities, (c) common intellectual experiences, (d) writing-intensive courses, emphasis writing in various formats, (e) undergraduate research, (f) collaborative assignments or projects, (g) diversity and/or global learning, (h) internships, (i) community-based learning and (j) capstone courses as a final product (2008). Each of these activities are adaptable to every institution due to the flexibility of customization based on the needs of each institution: (a) funds set forth for each activity, (b) populations being served, (c) specialty of the institution, (d) culture of the institution and (e) community support, within the institution and greater community (Kuh, 2008). Kuh recommended each student must successfully complete at least two high impact practices one during their first year at any institution, no matter the type, and one in their field of study or major (Kuh, 2008). A valuable aspect of HIL strategy that assists in meaningful learning is of high quality and frequent feedback from faculty that is aimed to develop a mentor relationship (Kuh, 2008) and assist in creating common intellectual learning experience (Burbach et al., 2012).

An integrative learning environment requires more than professional development or creating a culture to support efforts. HIL requires skills for implementing HIL and commitment due to the trials and resources required. (Huber, Hutchings, Gale, Miller, & Breen, 2007). Huber and colleagues described a culture that utilizes faculty, staff and students to engage in conversation to set goals and develop curriculum collaboratively (2007). In an effort to spark the needed conversation, the

utilization of premade activities that promote high-impact learning experiences could be implemented in specific content area as indicated in the research by Brophy, Lambert and Anagnos (2011) to reduce the amount of time needed in preparation or course activities

Encouraging the implementation of HIL requires administrator and academic leaders to be cognizant of faculty awareness, understanding and willingness to implement these strategies. This cognizance can assist facilitation of the culture of support articulated as necessary in other studies (Huber et al., 2007). Thus, an understanding of faculty perceptions regarding engagement in HIL is critical in establishing strategies to encourage HIL implementation.

Theoretical Framework

The theoretical framework for this study was built upon motivation and more specifically, expectancy theory. “Expectancy theory is a process of motivation, according to which motivation is a function of individual’s perceptions of their environment and the expectations they form based on these perceptions” (Fudge & Schlacter, 1999, p. 296). Guth and MacMillan (1986) described participants to behave a certain way through the expectancy theory of motivation. This theory is described with two factors: (a) participants develop an evaluation of the probability of their effort that lead to a proposed performance of the individual and (b) if their performance will lead to the organization’s desired outcome. These factors are affected by the perception of the individual and the organization’s ability to perform while meeting all goals set forth. Additionally, the perception of value in a proposed strategy by participants is critical

(Guth & MacMillan, 1986) otherwise full support may not be realized. Wahba and House (1974) noted through expectancy theory research that motivation to work is the attainment of extrinsic rewards connected to desired behaviors.

Purpose and Objectives

The purpose of this study was to determine the knowledge, awareness and importance of high impact learning experiences as perceived by teaching faculty in a College of Agriculture and Life Science at a land-grant institution. The objective of the study was to articulate knowledge and awareness as well as appropriate methods to support teaching faculty in incorporating effective high impact learning experiences into their instruction.

Methods and Procedures

Survey methodology was utilized to collect data. Respondents replied to a 96-item survey that required 30-35 minutes to complete. The survey included four distinct sections: (a) demographics, (b) level of awareness of Bloom's Taxonomy, (c) attitude towards higher order thinking levels and (d) high impact learning awareness (see Appendix A). The first section provided the researcher with descriptions of the respondents. The second section of the survey addressed awareness of Bloom's Taxonomy of Educational Objectives. The third section of the survey addressed aspired level and attitude towards teaching at higher levels of cognition. The fourth section addressed awareness and perception of respondents of high impact learning strategies. The second and third sections were addressed in another article titled, *An Examination of College of Agriculture and Life Science Faculty Perspectives Regarding Higher Order*

Thinking Opportunities for Students. The article reported here addressed the questions related to the perception of high impact learning by faculty: (a) awareness and personal definition; (b) degree of importance; (c) interest in leading courses; (d) awareness of university importance and (e) suggestions that would assist implementation. The data found in section one was utilized to assist in describing respondents.

The survey was implemented following the guidelines put forth by Dillman (2009). A pre-notice was distributed to the faculty in the college to inform possible respondents of the purpose of the study and to notify them that a survey would be forthcoming (see Appendix B). The initial notification (see Appendix C) was dispersed a week later informing faculty the survey was available for completion with a direct link utilizing the university sponsored survey software, Qualtrics™ (2009) (see Appendix A). A reminder was distributed four week later to respondents who had not yet completed the survey (see Appendix D). The final reminder was dispersed to the remaining non-respondents four weeks later (see Appendix E).

The population for the study included all teaching faculty in a College of Agriculture and Life Sciences during the spring 2013 semester with a population of 328 teaching faculty. Potential respondents held a teaching faculty position in one of the 14 departments in the College of Agriculture and Life Sciences: (a) Agricultural Economics, (b) Animal Science, (c) Agricultural Leadership, Education, and Communications, (d) Biochemistry/Biophysics, (e) Entomology, (f) Biological and Agricultural Engineering, (g) Ecosystem Science and Management, (h) Horticultural Sciences, (i) Plant Pathology and Microbiology, (j) Nutrition and Food Science, (k)

Recreation, Park and Tourism Sciences, (l) Poultry Science, (m) Soil and Crop Sciences, and (n) Wildlife and Fisheries Sciences. The specific list of teaching faculty was developed utilizing data readily available through websites published by the institution and then confirmed by a departmental spokesperson.

Eighty-five respondents completed the survey in its entirety. It was found that there were at least two to 16 respondents per department, except for the department of Poultry Sciences who had no respondents. Non-response bias was addressed through a comparison of early to late respondents as recommended by Lindner, Murphy and Briers (2001). Early responders consisted of 58 individuals and late responders consisted of 27 individuals. No differences were found between early and late responders.

The respondents mean age was found to be 55 years of age and gender was predominately male. Respondents had a mean of 20 years of teaching experience. Fifty-six percent of respondents reported to have received recognition for their teaching efforts. Sixteen percent of the respondents reported not being on a tenure track. Twenty-two percent of the respondents reported that they had not received formal training in regard to teaching. A doctoral degree was reported as being held by 91% of respondents and the remaining 9% held a master's degree as their highest level of education.

Limitations of the Study

Given that 56% of the respondents reported having received a teaching award, a limitation existed that individuals more interested in teaching were more likely to

complete the instrument. In addition, it is recognized that the length of the instrument (96-items) may have been an influencing factor in the low response rate.

Findings

Respondents' knowledge, awareness, and importance of High Impact Learning (HIL) experiences were assessed and respondents were encouraged to describe methods that would encourage the use of high impact learning experiences. Respondents reported three degrees of familiarity with HIL: (a) 51% were familiar, (b) 20% indicated a degree of familiarity and (c) 29% were unfamiliar. Sixty-seven percent ($n=57$) of the respondents reported a definition of HIL when asked. A trend within the definitions was that there was a failure to recognize that HIL occurred outside the normal classroom setting. Many of the definitions articulated faculty and student interaction as a part of HIL experiences. Study abroad courses were specifically mentioned as being an activity that could be labeled as HIL.

The respondents were asked to share their awareness of the college's initiative regarding HIL in courses offered to students. The findings revealed that 42% of respondents were aware, 13% of the respondents might be aware and 31% of the respondents did not know of the importance that the college was placing on HIL activities. Fourteen percent of the respondents did not answer this question.

The respondents were asked to evaluate the importance of high impact learning for both undergraduate and graduate students with the options of unimportant, of little importance, moderately important, important and very important (see Table 4). With concern to undergraduate students, 89% of the responding teaching faculty felt that HIL

was “moderately important” or “important”. In regard to graduate students, 89% of the teaching faculty felt it was either “important” or “very important” to take part in HIL practices. Examination of the findings revealed that a higher number of faculty believed that HIL was “very important” for graduate students than for undergraduate students.

Table 4

Respondents’ Perceptions of Degree of Importance of High Impact Learning for Undergraduate and Graduate Students in a Study to Determine Faculty Awareness of High Impact Learning Strategies and Implementation. (N=85)

Level of Importance	Undergraduate Students		Graduate Students	
	<i>N</i>	%	<i>n</i>	%
Unimportant	0	0	2	2.4
Of Little Importance	2	2.4	1	1.2
Moderately Important	34	40.0	6	7.1
Important	42	49.4	22	25.8
Very Important	7	8.2	54	63.5
Total	85	100	85	100

Findings revealed that 79% of the respondents were interested in leading a HIL course for undergraduates while 67% of the respondents were interested in leading a HIL course for graduate students. Table 5 reveals the degrees of faculty interest for both undergraduate and graduate courses.

Table 5

Respondents' Interest in Conducting a High Impact Learning Experience in an Undergraduate or Graduate Course (N = 85)

Interest	Undergraduate Course		Graduate Course	
	<i>n</i>	%	<i>n</i>	%
Yes	40	47.0	32	37.6
Maybe	27	31.8	25	29.4
No	14	16.5	18	21.2
No Response	4	4.7	10	11.8
Total	85	100	85	100

Respondents were asked to respond to the open-ended question: “What would assist you in conducting High Impact Learning Experiences in your courses being taught in the College of Agriculture and Life Sciences?” An in-depth review of the responses indicated an overarching response related to the need for additional funding to support travel to allow students to experience HIL. In addition, teaching faculty reported a lack of time for effective implementation as teaching load was already high. Respondents indicated the need for three levels of support through the open-ended question: (a) administration, (b) colleagues and (c) student. Table 6 identifies the supportive needs as described by respondents’ at all three levels of support.

Table 6

<i>Respondent's Needs to Successfully Implement High Impact Learning Strategies</i>	
Administration Support Areas	
Professional Development Needs	
Description of HIL strategies and HIL goals for the college and each department	
Experience HIL as a learner	
Assessment of HIL	
Report current HIL experiences and outcomes along with bi-annual reporting	
Recommendations for Assistance/Recognition	
High quality teaching assistants with smaller class sizes	
Reduce paper work for HIL experiences	
Alter degree plans to accommodate writing requirements	
Constructive feedback to improve HIL experiences	
Lighten other teaching/research requirements to allow focus on HIL experiences	
Recognize faculty participation in HIL	
Recognize that participation in HIL may mean time away from family	
Encourage less seasoned faculty to participate in HIL	
College Support Areas	
Collaborate for alignment of HIL experiences to customize experience to courses	
Support to allow students to leave campus for HIL participation	
Customize HIL strategies according to faculties' strengths	
Student Support Areas	
Develop strategies to motivate students to enable quality participation and learning	

Conclusions

Based on the findings, it was concluded that faculty in the College of Agriculture and Life Sciences are willing to become more informed regarding the implementation of

HIL to facilitate a high quality experience for those involved. Respondents revealed areas of support that would encourage the implementation of HIL learning experiences that would be beneficial for students.

Implications

Given that faculty overall were aware of HIL occurring in the college, implications exist regarding support needed for effective implementing of HIL to the full extent. Once increased support is in place to facilitate HIL, the implication exists that HIL could increase across the college.

Recommendations for Practice

Recommendations for practice include the creation of professional learning communities among individuals within departments and strategies to encourage interaction among faculty engaged in HIL. Professional learning communities would allow administration to address topics of professional development requested by respondents. Topics include strategies to create high quality rubrics to assess HIL and bi-annual reporting of HIL experience outcomes. Collaboration among faculty is recommended in the selection of HIL experiences. This collaborative effort would allow students to experience quality HIL experiences and encourage reflective thought. The use of VALUE rubrics (Rhodes, 2010), developed to properly evaluate the effectiveness of High Impact Learning experience, is an additional recommended practice. A level of performance is driven by various categories based on the experience of participants. The 15 VALUE rubrics evaluate the following topics: (a) civic engagement, (b) creative thinking, (c) critical thinking, (d) ethical reasoning, (e) informational literacy, (f) inquiry

and analysis, (g) integrative learning, (h) intercultural knowledge and competence, (i) foundations and skills for lifelong learning, (j) oral communication, (k) problem solving, (l) quantitative literacy, (m) reading, (n) teamwork and (o) written communication. Each rubric allows both the faculty and student to evaluate their growth during a HIL course by determining which of the four levels of performance they have experienced; (a) capstone, (b) milestone (contains two levels), and (c) benchmark (Rhodes, 2010).

Recommendations for Research

Recommendations for research include: (a) evaluation of the effectiveness of each HIL experience using the VALUE rubrics upon completion over a course of several consecutive implementations with the same faculty, (b) assessment of awareness of HIL with the same set of research questions at peer universities and (c) assessment of awareness in colleges across the university to compare results to the College of Agriculture and Life Sciences in order to provide the university administration guidance for further implementation of HIL.

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

Summary

The ability to think critically is an expected characteristic of college graduates. Institutions of higher learning have begun to search for strategies, areas of strength and possible areas of need that their teaching faculty may possess. This study included three overarching objectives that addressed critical thinking opportunities: (a) attitude toward teaching at higher levels of cognition; (b) awareness of Bloom's Taxonomy of Educational Objectives; and (c) awareness and interest in high impact learning experiences. Data collected revealed findings that indicate faculty held an overall positive attitude towards teaching with higher order thinking opportunities for their students. Respondents expressed the need for the development of more advanced assessment skills and abilities and expressed interest in learning more about high impact learning experiences. Respondents also indicated the need for incentives, support, and professional development opportunities to facilitate high quality implementation of programs and strategies.

Conclusions

The participants in this study provided insightful information related to the encouragement of higher order thinking and the implementation of high impact learning. Based on the positive attitude towards teaching at higher levels of critical thinking, it was concluded that faculty would be willing to participate in activities that increase their knowledge and skills in ways that would positively impact student learning. The data

gathered provided insight and guidance for those in a position to make decisions about areas such as professional development, support, and incentives.

Objective I – Aspired Levels and Attitude Regarding Teaching with Higher Order Thinking Opportunities

Respondents' attitude towards higher order thinking was positive with a mean of 226. A correlation between personal characteristics of teaching faculty (such as tenure or tenure track, age and award winner) and their attitude towards teaching at higher levels of cognition was not found. Respondents provided evidence that supported the utilization of different activities for higher order thinking opportunities. Findings revealed that respondents exhibited a need for improvement in assessment development and to utilize all four levels of cognition during a semester. It was concluded that the attitude documented regarding higher order thinking opportunities indicates a willingness to continue to expand opportunities for students to develop critical thinking skills.

Objective II – Awareness of Bloom's Taxonomy of Educational Objectives

In respect to faculty's awareness of Bloom's Taxonomy, data indicated faculty's level of awareness was not equally distributed among all six levels of rigor. Respondents demonstrated the ability to identify lower levels of rigor; however, respondents revealed difficulty in identifying statements written at higher levels of Bloom's Taxonomy. It is possible that if a different model had been utilized to identify statements, such as the Newcomb and Treves (1987) model that consisted of only four levels of cognition: (a) remembering; (b) processing; (c) creating; and (d)

evaluating, that respondent's identification could have resulted in a higher percentage of accuracy. Nonetheless, respondents revealed a need for exposure to the various levels of rigor documented within Bloom's Taxonomy of objectives.

Objective III – Awareness and Interest in High Impact Learning Experiences

Respondents exhibited an interest in instructing or participating in high impact learning strategies with support to fully implement these experiences. When examining the responses related to HIL, respondents expressed interest in learning more about the framework of HIL, how it appears in a classroom, and the intended goals of implementation as it relates to the degree of importance in each department and to the college's goal. Respondents provided several suggestions that could improve and expand the implementation of HIL experiences. It was concluded that once faculty have been provided the necessary tools for implementation, success of HIL would flourish.

Implications

Based on the conclusions, the implication exists that the administration in the College of Agriculture and Life Sciences has been effectively leading and encouraging their faculty towards teaching at higher levels of thinking. In order to continue this trajectory, the administration could develop professional development opportunities that target each department's needs in meaningful ways such as those shared by respondents. High quality leadership has the potential of yielding high quality graduates.

Recommendations for Research

The following recommendations for research are separated based on the three objectives: (a) aspired levels and attitude regarding teaching with higher order thinking

opportunities, (b) awareness of Bloom's Taxonomy of Educational Objectives and (c) awareness and interest in high impact learning strategies.

Objective I – Aspired Levels and Attitude Regarding Teaching with Higher Order Thinking Opportunities

Duplication of the study by utilizing the 50-item, Likert-scale attitude questions with an assessment of authentic teaching in the classroom by means of the assessment tool of the Florida Taxonomy of Cognitive Behavior (Brown, 1968) is recommended. Incorporating a qualitative aspect to the study would allow a better understanding of the respondent's responses. Further, a comparative study between faculties from different colleges at the same institution, utilizing the same instrument, would enable a better understanding of university initiatives that could be put in place to further higher order thinking opportunities.

Objective II – Awareness of Bloom's Taxonomy of Educational Objectives

Due to the lack of accuracy in identification of objectives at varying levels, the need exists for the opportunity for faculty to gain a better understanding of the varying levels of rigor. Professional development opportunities related to objective writing and specifically Bloom's Taxonomy would empower faculty with a tool that could assist them in encouraging critical thought within their classrooms.

Objective III - Awareness and Interest in High Impact Learning Experiences

A comparative study of similar HIL experiences across the college would enable a deeper understanding of what characterizes high impact learning opportunities. In

addition, case studies that document collaborative efforts to support HIL experiences would be beneficial.

Recommendations for Practice

As professional educators, faculty should have continual professional development that focuses on teaching and learning of educational practices. Thus, it is recommended that faculty be provided with opportunities through professional learning communities to learn more regarding higher order thinking and high impact learning experiences. The common involvements could produce discussion among faculty and create a spiral effect in the level of engagement and willingness to participate. Faculty's awareness and understanding of Bloom's Taxonomy could also be addressed through these professional learning communities.

In regard to high impact learning strategies specifically, the following areas of support are recommended: (a) offer a framework of HIL, (b) provide supplementary funding, (c) provide faculty reports documenting HIL outcomes based on the VALUE rubrics, (d) increase student accountability, (e) provide recognition to faculty for their efforts and (f) enable outreaching to feeder schools into the college to express the importance of student readiness for the high demands of college. The overall effectiveness of a HIL experience should be continuously evaluated according to the appropriate VALUE rubrics, and the outcomes should be reported to the entire department.

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APPENDIX A
TEACHING FACULTY SURVEY

An Examination of Higher Order Thinking Opportunities Provided by Faculty in a College of Agriculture and Life Sciences at a Land Grant Institution

STATEMENT OF CONSENT

The following study is to determine and measure the levels of cognitive behaviors of faculty in the aspects of aspired levels of instruction, attitude towards teaching at higher levels of cognitive thinking, along with perception and awareness of high impact learning of classes in the College of Agriculture and Life Sciences at Texas A&M University. By completing the questionnaire you are consenting to participate in the study. Your participation for the study should take between 30-45 minutes.

Your participation in this study is completely voluntary and you are not required to participate. If you choose not to participate, there will be no loss or penalty to you from Texas A&M. If at any time you wish to withdraw from the study, you are free to do so at any time.

If you desire to withdraw, please close your internet browser and notify Dr. Theresa Murphrey, the principal investigator by email (t-murphrey@tamu.edu) or by phone (979-458-2749), or Crystal Dube, graduate student by email (cdube@tamu.edu) or by phone (817-846-8489). Questions about the Research: If you have questions regarding this study, you may contact Dr. Theresa Murphrey, the principal investigator, by email t-murphrey@tamu.edu or by phone (979) 458-2749. Questions about your Rights as Research Participants: For questions about your rights as a research participant; or if you have questions, complaints, or concerns about the research, you may call the Texas A&M University Human Subjects Protection Program office at (979) 458-4067 or irb@tamu.edu.

I have read and understand the above consent form and desire of my own free will to participate in this study.

Agree

☐

Do not agree

☐

Please indicate which best describes you:

☐

I teach undergraduate courses in the College of Agriculture and Life Sciences.

☐

I teach graduate courses in the College of Agriculture and Life Sciences.

☐

I teach both undergraduate and graduate courses in the College of Agriculture and Life Sciences.

☐

I do not teach courses in the College of Agriculture and Life Sciences.

PART I: Demographic and Class Information

Directions: The following are to help us better understand you and your class. Please answer them to the best of your knowledge.

Choose or fill in the blank with the appropriate answer.

In what year were you born?

Have you received formal training in regard to teaching?

☐

Yes – sufficient

☐

Yes – Minimal

☐

None

Including this year, how many years have you been teaching at the university level?

Have you received an award related to your teaching efforts during your years of service?

☐ Yes ☐ No

If yes, please briefly describe the award (s)

Do you teach an honors course?

☐ Yes ☐ No

Have you obtained tenure as of August 2012?

☐ Yes ☐ No

Are you on track to obtain tenure?

☐ Yes ☐ No

Please pick one course and use that course as your point of reference in answering the following questions. We recognize that some faculty do teach multiple courses.

For the course you selected -- please answer the following:

	200 Level	300 Level	400 Level	600 Level
Type of Course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Is this course required or an elective?

☐ Required course ☐ Elective course

Please name the required course you are describing.

Please name the elective course you are describing.

Is the course you are describing taught at the honors level?

☐ Yes ☐ No

For this class, how would you describe the approximate percentage of gender break down in a typical semester.

- ☐ Males
- ☐ Females
- ☐ More males than females
- ☐ More females than males
- ☐ Equal males and females

Which classification of student usually enrolls in your course? Select all that apply.

- ☐ Freshman
- ☐ Sophomore
- ☐ Junior
- ☐ Senior
- ☐ Graduate

What is number of students with **Individualized Education Plans** (learning accommodations) in your course?

0 - 5 students

6 - 10 students

11 - 15 students

More than 15 students

☐
☐
☐
☐

Below are ethnic groups defined by Texas A&M University. Please indicate which groups are usually present in your course. Select all that apply.

- ☐ Anglo Saxon (White)
- ☐ African American (Black)
- ☐ Hispanic
- ☐ Asian
- ☐ Native Hawaiian
- ☐ American Indian
- ☐ International
- ☐ Unknown

PART II: Awareness of BLOOM'S TAXONOMY

Below you will find Bloom's Taxonomy explained as it is broken up into six levels.

DIRECTIONS: For each of the following student performances, please indicate **your perception** of each statement based on Bloom's Taxonomy.

Demonstrate five different welding joints through laboratory exercises.

Knowledge

Comprehension

Application

Analysis

Synthesis

Evaluation

☐
☐
☐
☐
☐
☐

List the parts of the digestive tract of a horse.

Knowledge

Comprehension

Application

Analysis

Synthesis

Evaluation

☐
☐
☐
☐
☐
☐

Explain why a molecule is organic or inorganic based on atomic structure and composition.

Knowledge

Comprehension

Application

Analysis

Synthesis

Evaluation

☐
☐
☐
☐
☐
☐

Decide which social media tool would be most effective for marketing efforts.

Knowledge

Comprehension

Application

Analysis

Synthesis

Evaluation

☐
☐
☐
☐
☐
☐

Dissecting a small animal, will gather information to validly conclude, without any doubt, reason for death.

Knowledge Comprehension Application Analysis Synthesis Evaluation

☐ ☐ ☐ ☐ ☐ ☐

Given several pesticides choose one and argue why it should be used over other pesticides based on side effects and consumer needs.

Knowledge Comprehension Application Analysis Synthesis Evaluation

☐ ☐ ☐ ☐ ☐ ☐

Distinguish between "air layering" and "root cutting" propagation techniques.

Knowledge Comprehension Application Analysis Synthesis Evaluation

☐ ☐ ☐ ☐ ☐ ☐

Given six wildlife laws, decide which laws are federal and state level regulations.

Knowledge Comprehension Application Analysis Synthesis Evaluation

☐ ☐ ☐ ☐ ☐ ☐

Restate in your own words, two types of topiaries.

Knowledge Comprehension Application Analysis Synthesis Evaluation

☐ ☐ ☐ ☐ ☐ ☐

Create an effective business economic practice based on the current economic situation and a plan to implement the strategy.

Knowledge Comprehension Application Analysis Synthesis Evaluation

☐ ☐ ☐ ☐ ☐ ☐

Recall ten cattle breeds and their purposes for ownership.

Knowledge Comprehension Application Analysis Synthesis Evaluation

☐ ☐ ☐ ☐ ☐ ☐

Classify insects based on taxonomy characteristics.

Knowledge Comprehension Application Analysis Synthesis Evaluation

☐ ☐ ☐ ☐ ☐ ☐

PART III: ASPIRED LEVEL AND ATTITUDE TOWARD INSTRUCTION

Note: The following statements are based on a previous study. We recognize that there are a lot of statements, please take the time to complete all of them. We appreciate your assistance.

DIRECTIONS: For each of the following items, please indicate the degree to which you agree or disagree with each statement.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
It would take more time than it is worth to increase my cognitive level of teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoy opportunities for increasing my cognitive level of teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want to teach in a way that allows students to see higher levels thinking exhibited.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to know more about teaching at higher cognitive levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teaching at the higher cognitive levels requires too much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
advanced participation.						
Teachers need to encourage students to practice higher level thinking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students can get the knowledge they need from high school by memorizing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Freshman level courses cannot be taught at higher levels of cognition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important for teachers to assist students in developing higher level thinking skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Higher level teaching is critical to the permanent learning of students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

DIRECTIONS: For each of the following items, please indicate the degree to which you agree or disagree with each statement.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
I am frustrated about teaching at higher cognitive levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am excited about teaching at higher levels cognition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of students at the undergraduate level allows for higher cognitive level teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teachers present too much material at the evaluating level.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want to teach at higher cognitive level.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teachers' objective should be written to challenge students at higher cognitive levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am willing to devote more time, if needed, to grade assignments written at higher cognitive levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I intend to substantially revise my current cognitive level of teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My subject matter does not lend itself to higher level teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teachers encourage too much remembering.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

DIRECTIONS: For each of the following items, please indicate the degree to which you agree or disagree with each statement.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
The nature of lower level courses does not require higher cognitive level teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students will operate at the cognitive level at which I expect them to operate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Large classes do not lend themselves to methods which reflect higher cognitive level teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Modeling higher level thinking in class will not influence students to think at higher levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students are willing to do more than memorize.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is the responsibility of the student to take information from class and use it at higher cognitive levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am willing to spend more time on certain topics to teach them at higher cognitive levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important for students to be able to process information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students should be given more opportunities to exercise creativity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teachers do not have the extra time needed to teach across the levels of cognition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students, in my courses, generally are not mentally ready to be challenged at higher cognition levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

DIRECTIONS: For each of the following items, please indicate the degree to which you agree or disagree with each statement.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
Any subject matter can be taught at higher cognitive levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting students to evaluate is an important goal of higher cognitive level teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
Students will develop more life-long learning skills if they are taught to create and evaluate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I try to teach students to develop new ideas, products, or processes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I want to teach across levels of cognition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Skills in evaluating will prove to be valuable to students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I look forward to the challenge of narrowing the discrepancies between my desired and actual teaching scores.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students in my course deserve to be challenged at higher cognitive levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I try to teach students to process the information that I present.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I receive recognition by my co-workers for accomplishing higher cognitive level teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The cognitive level at which I teach is adequate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

DIRECTIONS: For each of the following items, please indicate the degree to which you agree or disagree with each statement.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
I could teach at higher levels of cognition, but choose not to teach at higher levels of cognition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As I teach at higher cognitive levels, I expect to see students operating at higher cognitive levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The higher the level of the course, the higher the cognitive level at which the course should be taught.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I try to teach students to evaluate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would need help in order to teach at higher levels of cognition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
I have to be patient to nurture higher level thinking among students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Students complain too much when they are taught at higher levels of cognition.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I teach students to separate fact from opinion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I typically have one instructional method for each class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use technology as an instructional component during the semester.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I provide opportunities for student-to-student interaction during my courses.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

For the following questions, please describe the following to the best of your ability to reflect an accurate description of your teaching style.

Of the four levels of cognition listed below, please choose the types of cognition which your students are activity engaged in for the course you are choosing to describe. Select all that apply.

- ☐ Remembering
- ☐ Processing
- ☐ Creating
- ☐ Evaluating

Please describe how you **encourage** your desired level of cognitive engagement.

Briefly describe how you **develop assessments** for your students to show they have successfully mastered the desired objective?

What type of assessment do you feel are **most reflective** of meaningful learning?

What **characteristics** do you search for that informs you as an educator that meaningful learning has occurred in your students?

How important do you feel **verbal communication among students** is for meaningful learning to occur?

Unimportant Of Little Importance Moderately Important Important Very Important

☐ ☐ ☐ ☐ ☐

What strategies do you use in developing questions to encourage cognitive thinking for learners?

A list of teaching strategies is listed below. Please indicate which of these teaching strategies you are currently implementing in the course you have chosen to describe.

- | | |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Journal Writings | <input type="checkbox"/> Debate Teams |
| <input type="checkbox"/> Critical Analysis | <input type="checkbox"/> Listening Teams |
| <input type="checkbox"/> Creative Visualizations | <input type="checkbox"/> Action Maze |
| <input type="checkbox"/> Scenario Buildings | <input type="checkbox"/> Pluses |
| <input type="checkbox"/> Dramatization | <input type="checkbox"/> Minuses |
| <input type="checkbox"/> Critical Incident | <input type="checkbox"/> Other -- I teach additional teaching strategies other than those listed. |
| <input type="checkbox"/> Implications | |

Please list additional teaching strategies below.

PART IV: IMPACT LEARNING

DIRECTIONS: Answer each of the following questions to the best of your understanding.

Are you familiar with High Impact Learning?

☐ Yes ☐ Maybe ☐ No

What is your definition of High Impact Learning?

The College of Agriculture and Life Science defines High Impact Learning Experiences to contain the following High Impact Educational Practices:

- First-year seminars and experiences
- Common intellectual experiences
- Learning Communities
- Writing Intensive courses
- Collaborative assignments and projects

- **Undergraduate research**
- **Diversity/global learning**
- **Service learning, community-based learning**
- **Internships**
- **Capstone courses and projects**

How important do you believe High Impact Learning Experiences are for **undergraduate students**?

Unimportant Of Little Importance Moderately Important Important Very Important

☐ ☐ ☐ ☐ ☐

How important do you believe High Impact Learning Experiences are for **graduate students**?

Unimportant Of Little Importance Moderately Important Important Very Important

☐ ☐ ☐ ☐ ☐

Interest and awareness about High Impact Learning Experiences.

	Yes	maybe	no
Are you interested in leading or conducting High Impact Learning Experiences for UNDERGRADUATE students?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you interested in leading or conducting High Impact Learning Experiences for GRADUATE students?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you aware of the importance that the College of Agriculture and Life Science has placed on the implementation of High Impact Learning Experience?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What would **assist you** in conducting High Impact Learning Experiences in your courses being taught in the College of Agriculture and Life Science?

Thank you for taking the time to participate in this study by completing this questionnaire.

APPENDIX B

TEACHING FACULTY'S PRE-NOTICE OF STUDY

May 14, 2012

Departments in the College of Agriculture and Life Sciences:

Please let this letter serve as documentation of support for the study entitled "Higher Order Thinking Opportunities Provided by Faculty in the College of Agriculture and Life Sciences at Texas A&M University."

Critical thinking is an important skill that our students need in order to compete in the job market and thus it is important that higher order thinking be encouraged in the classroom. The study being conducted by Crystal Dube will involve a random selection of faculty across our College and will include the completion of an online questionnaire focused on higher order thinking opportunities provided in courses. I am supportive of teaching faculty across all 14 departments being surveyed.

I have instructed Crystal Dube to visit with each Department in the College in order to obtain a listing of teaching faculty, along with their email addresses. This list will serve as the population from which the random selection of participants for her study can be solicited.

Thank you for your time and effort in support of this study.

A handwritten signature in black ink that reads "Chris Skaggs".

Dr. Chris Skaggs
Associate Dean for Student
Development College of
Agriculture and Life
Sciences
cskaggs@tamu.edu
979-845-3712

600 John Kimbrough Blvd., Suite 515
2402 TAMU
College Station, TX 77843-2402

Phone 979-845-3712 aglifesciences.tamu.edu
cskaggs@tamu.edu

APPENDIX C

TEACHING FACULTY'S NOTICE OF ACTIVATION OF STUDY

Subject: Teaching Questionnaire – College of Agriculture and Life Sciences

<<DATE>>

Dear Faculty,

We are writing to ask your help in a study about instruction within the College of Agriculture and Life Sciences to gain a better understanding of higher order thinking opportunities provided to students. Your input will be helpful in enhancing the instruction and preparedness of undergraduates of Texas A&M University.

Your expertise in teaching agriculture courses in the College of Agriculture and Life Sciences allows you to provide insight that could prove extremely valuable to us. The link below will direct you to a questionnaire. The entire questionnaire will take approximately 30-35 minutes to complete.

<URL>

Your answers are completely confidential and will be released only as summaries in which no individual's answers can be identified. Rest assured that your refusal to participate in this study will not affect your relationship with Texas A&M University; it will not result in any penalty or loss of benefits to which you might otherwise be entitled.

Should you have any questions regarding this study, please do not hesitate to contact either of the individuals listed below. You may also contact Texas A&M University – College Station Campus' IRB Office at (979) 458-1467 for further information concerning human research in research studies.

Thank you in advance for your participation! We look forward to receiving your response
<DATE>. Have a great day.

Sincerely,

Crystal Dube
Masters Student – Department of Agriculture, Leadership, Education, and Communications
Texas A&M University
cdube@tamu.edu
(817) 846-8489

Theresa Murphrey
Assistant Professor
Department of Agriculture, Leadership, Education, and Communication
t-murphrey@tamu.edu
(979) 845-2749

Dr. Chris Skaggs
Associate Dean for Student Development
College of Agriculture and Life Sciences
cskaggs@tamu.edu
979-845-3712

APPENDIX D

TEACHING FACULTY'S REMINDER FOR PARTICIPATION IN STUDY

Subject: Teaching Questionnaire – College of Agriculture and Life Sciences

<<DATE>>

Dear Faculty,

Recently you received an email with a link to an electronic questionnaire asking for your help with a study regarding higher order thinking abilities. For your convenience, we are providing you with an additional opportunity to complete the electronic questionnaire.

Your input will be used to determine methods to enhance the instruction, learning environment and preparedness of undergraduates of Texas A&M University.

If you have already completed the questionnaire, please accept our apology and appreciation for your participation.

If you have not completed the questionnaire, please go to the link provide below to complete the questionnaire.

<URL>

Participation in this study is voluntary; however, you can help us very much by taking a few minutes to share your experience and opinion about higher order thinking in the College of Agriculture and Life Sciences of undergraduate classes. Should you choose not to participate in this study, please notify either persons listed below. Should you have any questions regarding this study, please do not hesitate to contact any of the individuals listed below.

Thank you in advance for your participation! We look forward to receiving your response by <DATE>. Have a great day.

Sincerely,

Crystal Dube
Masters Student
Department of Agriculture, Leadership, Education, and Communications
Texas A&M University
cdube@tamu.edu
(817) 846-8489

Theresa Murphrey
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APPENDIX E

TEACHING FACULTY'S FINAL REMINDER FOR PARTICIPATION

Subject: Teaching Survey – College of Agriculture and Life Sciences

<<DATE>>

Dear Faculty,

Approximately four weeks we sent you an email with a link directly connected to an electronic questionnaire asking for your assistance with a study regarding higher order thinking opportunities. For your convenience, we are providing additional opportunity to complete the electronic questionnaire.

Your input will be used to determine methods to enhance the instruction, learning environment and preparedness of undergraduates of Texas A&M University.

If you have not complete the questionnaire and would like to complete the questionnaire, please find and click on the link of the questionnaire below.

<URL>

If you have not completed the electronic questionnaire, please do so.

Regardless of when you chose to complete the electronic questionnaire your answers are completely confidential and will be released only as summaries in which no individual's answers can be identified. Your name will be deleted from the mailing list and never connected to your answers in any way.

Participation in this study is voluntary; however, you can help us very much by taking a few minutes to share your experience and opinion about higher order thinking in the College of Agriculture and Life Sciences of undergraduate classes. Should you have any questions regarding this study, please do not hesitate to contact any of the individuals listed below.

Thank you in advance for your participation! We look forward to receiving your response by <DATE>. Have a great day.

Sincerely,

Crystal Dube
Masters Student – Department of Agriculture, Leadership, Education, and Communications
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APPENDIX F

VALUE RUBRICS

An Overview of the VALUE Rubric

High impact learning experiences can be evaluated through the use of the Valid Assessment of Learning in Undergraduate Education, VALUE Rubrics, to establish the learning outcomes of an experience and thus document the value of student learning while increasing retention and graduation. The VALUE Rubrics were developed through a partnership among colleges and universities to ensure students were engaged in a liberal education during their time in higher education to focus on direct assessment of student scholarship to articulate, measure and reinforce achievement of the Essential Learning Outcomes (Universities, 2014). The VALUE project aims to: (a) draw on student developed work through essential curriculum and co-curriculum activities; (b) assess based upon well-developed rubrics supported by campus administration and judgments of nominated experts; and (c) assist students in the development of electronic portfolios to display and organize work appropriate for selected audiences (Universities, 2014).

In order to assess the Essential Learning Outcomes desired, a twelve member board developed 16 VALUE Rubrics that are broken up into three distinct categories: (a) intellectual and practical skills, (b) personal and social responsibility and (c) integrative and applied learning (Rhodes, 2010). In the category of intellectual and practical skills, students are assessed on ten qualities: (a) critical thinking, (b) creative thinking, (c) information literacy, (d) inquiry and analysis, (e) oral communication, (f) problem solving, (g) quantitative literacy, (h) reading, (i) teamwork and (j) written

communication (Rhodes, 2010). In the category of personal and social responsibility, students are assessed on five qualities: (a) civic knowledge and engagement (local and global), (b) ethical reasoning, (c) foundations and skills for lifelong learning, (d) global learning and (e) intercultural knowledge and competence (Rhodes, 2010). The last category of integrative and applied learning assesses students using integrative and applied learning (Rhodes, 2010). The VALUE Rubrics can be viewed in their entirety at <http://www.aacu.org/VALUE/rubrics/>.